AGLAIS URTICAE AB. CONJUNCTA NEUBERG (LEPIDOPTERA: NYMPHALIDAE) FOUND IN THE WILD

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Abstract

Unusual variations of nymphalid butterflies, including a very dark form of *Aglais urticae ab. conjuncta* Neuberg observed in southern England, 2005, are reported.

On 4.ix.2005, Ken Medler noticed an unknown butterfly in his garden at Bradwell (TG5004) near Great Yarmouth (VC25) (Plate 2, Fig. 3). It obligingly remained in residence for 3 days, and his photograph found its way to the Suffolk recorder for identification. It was a very dark form of the Small Tortoiseshell, close to ab. *semi-ichnusoides* illustrated in most good books (e.g. Thomas & Lewington, 1991), yet this specimen was even darker and brought to mind a series of breeding experiments displayed by Karl Bailey at our annual exhibition in 2004. By luck, the exhibition report had just been published in the latest edition of the *Journal*, and included a photograph (Bailey, 2005). Contact with Karl unearthed more about temperature shock.

During the last 24 hours of larval existence and the first 48 hours of the pupal stage, metamorphosis reaches the stage of "pattern differentiation" during which morphogens trigger the colouration of scales forming wing patterns. This process is progressive, with the forewings differentiating before the hindwings, the dark scales developing in accordance with a genetically pre-determined pattern – to orange, yellow, white and finally the metallic blue parts of the hind wing. A more comprehensive description of wing pattern development is given by Nijhout (1991).

An extreme temperature shock at a critical time can inhibit the differentiation process. The impact is transient, leaving parts of the forewing melanic, after which differentiation may resume to colour remaining parts of the pattern. In nature, such a shock could occur when a larva settles for pupation in a shady situation and an object causing the shade is removed, leaving the pupa in direct sun. The insect needs to reach c. 44°C to create these forms, a temperature that also sterilises the insect, and an extra 1°C is fatal (K. Bailey, pers. comm.).

Most of our knowledge comes from experiments in captivity, during which artificial heat or cold is applied at the critical time. Temperature and light experiments were conducted in the 19th century (Standfuss, 1900) and were studied in *A. urticae* by Professor E. B. Poulton in 1892 (Ford, 1945). Little has been published in the UK since Merrifield (1893) described his experiments on *Vanessa atalanta* (L.), and current research has turned to the hormonal control mechanisms that activate the processes of development.

In *A. urticae*, there is a range of aberrations; one level of exposure creates ab. *semi-ichnusoides* Pronin, a little more fuses all three black costal blotches of the forewing to create ab. *conjuncta* Neuberg, and the most extreme exposure produces an almost entirely melanic form, ab. *osborni* Donckler. Ken Medler's field specimen was the intermediate form, ab. *conjuncta*. The three forms vary in rarity; *semi-ichnusoides* is rare, *conjuncta* even more rare, and *osborni* the rarest. It is difficult to discover how frequently any of these occur in nature; few wild-caught specimens are to be found in museum collections. The Hope Collection includes the results of the Merrifield experiments. The Natural History Museum's Cockayne Collection contains a wide range of natural and experimental aberrations, and these can be inspected on-line at: www.nhm.ac.uk/entomology/cockayne where similar forms of other Nymphalidae may also be found. In addition, a number of the Argynninae, notably *Argynnis aglaja* L. can appear with heavy black suffusion along the lines of the veins. A selection of these partially differentiated melanic forms is illustrated in Emmet & Heath (1990).

There is a subtle difference between the results of heat and cold. Specimens of *A. urticae* exposed to heat feature a series of fine black lines along the veins at the outer margin of the forewing (Plate 2, Fig. 3), but these lines are absent from subjects of cold shock treatment. Experimentally, cold shock aberrations seem easier to reproduce than those following heat. It also seems that the effects occur more readily in spring and autumn, during the periods when daylight hours are changing most rapidly.

Russwurm (1978) illustrates one wild-caught ab. *conjuncta* from Ringwood, Hants, 30.ix.1947. Since heat shock also renders the butterflies sterile, each example is a one-off, and not a genetic strain. Given the millions of *A. urticae* over the years, it seems fair to judge these aberrations genuinely rare in the wild.

Two Suffolk sightings of the rather less rare aberration *semi-ichnusoides* are on record. On 26.viii.1990, Jim Foster photographed one in his Stonham Aspal garden (Foster, 1991). In September 2003, Richard Stewart found one in his Ipswich garden (Stewart, 2004), although this butterfly remained just out of photographic range.

Interestingly, at least three other aberrations of different species also put in appearances in 2005. In Bedfordshire, at Sharpenhoe Clappers on 4.vii.2005, Peter Glenister photographed an extremely melanic *Argynnis aglaja* ab. *wimani* Holmgren (unpublished). David Dennis had the amazing good fortune to find first *V. atalanta* ab. *klemensiewiczi* Schille and then *P. c-album* ab. *reichstettensis* Fettig in his Buckinghamshire garden within days of one another [(19.ix.2005 & 21.ix.2005 – Dennis (2005) includes photographs of both)]. These two wild insects had apparently pupated on the side of a metal barn, and it seems conceivable that this could have subjected them to higher than ambient temperatures. Has any reader heard of such aberrations created under similar conditions?

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